

activity 1

forest food chains: producers and consumers

grades

3rd–5th

estimated time

30 minutes

objectives

Students will be able to

1. Identify the primary source of energy plants use to produce their own food.
2. Explain the difference between a producer and consumer.
3. Sequence the flow of energy through a forest food chain beginning with the sun.
4. Classify populations of organisms as producers or consumers by the role they serve in the ecosystem.
5. Predict the possible effects of removing a population from a food chain.

teacher preparation

This activity works best in a large, open area such as the schoolyard or ball field. It reinforces knowledge and understanding of organism, population, community, ecosystem, producer and consumer. The *Forest Food Chain Cards* also contain information on types of consumers and predator and prey, but these are not used until *Activity 2* and *3*.

Copy, cut apart and laminate (if possible) the *Forest Ecosystem Cards*. Consider making extra sets of cards to allow for larger or multiple classes, to increase the number of food chains based on the number of Producer Cards included in each session, and to create different food chains in each session.

To accommodate different class sizes, basic sets of *Forest Food Chain Cards* should include:

Number of students	Sun card	Producer cards	Consumer cards
20	1	5–8	15–20
25	1	8–10	30–35
30	1	8–10	40–50

materials

Forest Food Chain Cards (more than one set, if needed)

Forest Food Chain Teacher Key

5–10 balls of yarn

procedure

1. Count out the number of producers and consumers required for one session. Place the balls of yarn in the center of the open area.
2. Place the Sun card with the other cards and shuffle the deck. Distribute cards randomly and instruct students to read their card carefully. **Make certain that a student has the Sun card.** Remind them that they will need to know 1) what plant or animal they are, 2) whether they are a producer or a consumer and 3) how they get their energy. (Ex: a mayapple plant is a producer and makes its own food using energy from the sun; a rabbit is a consumer and gets its energy by eating leaves, etc.; a bobcat is a consumer and gets its energy by eating woodland voles, etc.).
3. After reading the information on their cards, ask students with Producer Cards to stand to your right.

4. Ask students with Consumer Cards to stand to your left.

Q. Who is left alone?

A. The student with the Sun card should be left standing alone, because the sun is neither a producer nor a consumer.

5. Provide a ball of yarn to the student with the Sun card. Address the student with the Sun card [in a dramatic, fun voice] and provide him/her with instructions similar to: "You are the sun, and all our chains will begin with you. None of our producers or consumers can survive without you, so you must be very careful not to drop your end of each ball of yarn because they connect you with each food chain. Are you up to the task of representing the sun?"

6. Connect producers to the sun:

- Choose one student with a producer card (from those to your right) and have that "producer" introduce him/herself to the group and explain why he/she is a producer. (Ex: I am leaves and I am a producer because I make my own food using energy from the sun.)
- Hand the loose end of a ball of yarn to the sun and hand the ball of yarn to the producer unwinding enough yarn to allow about two feet of space between them.
- Refer back to the group of producers and choose another producer and repeat the above process using a new ball of yarn for each producer. Continue until all producers are connected to the sun with a piece of yarn. Producers should not be connected in any way to each other.

Q. If these producers get their energy directly from the sun, what would get its energy directly from a producer?

A. A consumer would get its energy directly from a producer.

7. Connect consumers to producers:

- Ask students with consumer cards (those to your left) to raise their hand if they think they could be connected to one of the producers connected to the sun. As you choose students with raised hands, have each "consumer" introduce him/herself to the group and explain why he/she is a consumer. (Ex: I am a caterpillar and I am a consumer because I get my energy by eating or consuming leaves; or I am a striped skunk and I eat or consume fruits and berries; or I am a woodland vole and I eat or consume seeds.) Have students double check what they eat to be sure a proper link in each food chain is formed. Students representing consumers that eat both plants and animals may step up as long as there are student producers available that match up with what is listed on their card.
- Have each consumer stand next to a producer they consume. Have the producer continue to hold onto the strand of yarn while he/she unwinds and passes the ball of yarn to the consumer. Enough yarn should be unwound to allow about two feet of space between them. Continue until all producers are connected to the sun on one side and connected to a consumer on the other. Producers should continue to hold onto the piece of yarn.
- Any consumers who eat or consume only producers and who are not linked to a food chain should stand over to one side.

8. Connect consumers to consumers:

- Ask remaining students with consumer cards to join a food chain where they think they belong (i.e., next to a consumer that their card tells them they consume). Have each new "consumer" introduce him/herself to the group and explain why he/she is a consumer and why he/she believes she should be linked to that particular food chain. (Ex: I am a spider and I am a consumer because I get my energy by eating or consuming caterpillars; I am a great horned owl and I eat or consume skunks; I am a black rat snake and I eat or consume woodland voles.)
- Have students unwind the ball of yarn as it is passed to the new consumer. Enough yarn should be unwound to allow about two feet of space between them. The sun and all producers and consumers should continue to hold onto the piece of yarn.
- Repeat the process until all possible consumers have been linked to one of the food chains.
- Any consumers who eat other consumers and who are left unconnected to a food chain should join the other unconnected consumers over to the side.

9. "Look at all these food chains you've created. Congratulations! You are all getting the energy you need either directly from the sun or by consuming producers or other consumers. Wait a minute!" (Refer to the unlinked consumers.)

Q. What happened to these consumers?

A. They were not able to find the right food to eat.

Q. But we have all this food in all these chains. Why couldn't they find what they needed?

A. Other consumers ate their food; the animals that eat both producers and consumers had more choices; etc.

Q. What might happen to these consumers?

A. They might be hungry for a while until they find more food; they might starve and die; they might move away from their community to find food somewhere else; etc.

Q. I wonder if there are any places we might include them in our food chains.

A. Elicit suggestions from students and ultimately lead them to have each unlinked consumer read what they eat and try to find a place along a food chain for them to fit. Have the last consumer holding the ball of yarn unwind enough yarn to allow for the additional links to be inserted.

Some possible examples:

A chain that has: sun ➡ seeds ➡ songbird ➡ black rat snake

could become: sun ➡ seeds ➡ **insects** ➡ songbird ➡ black rat snake

A chain that has: sun ➡ leaves ➡ caterpillar ➡ rough green snake

could become: sun ➡ leaves ➡ caterpillar ➡ **spider** ➡ rough green snake

10. Have students include as many as possible. Referring to any remaining consumers:

Q. What shall we do with these unlinked consumers? What would happen in nature to a consumer that was not able to find food?

A. Consumers unable to find food could eventually starve and die.

Q. What happens to the bodies of consumers that die?

A. Their bodies break down and eventually become part of the soil.

Q. If these consumers become part of the soil, where could they possibly be placed within our food chains?

A. The dead consumers could become part of the soil used by the producers.

11. Have each chain discuss its parts (Ex: I'm a coyote which is a consumer that got its energy by eating a rabbit; I'm a rabbit which is a consumer that got its energy by eating grasses; I'm grass which is a producer that is able to make its own food by using energy from the sun. *[In a big booming voice]* I am the sun, and all food chains begin with me!) This repetition (and the repetition above as students initially link up) will reinforce the concept and will help capture students who may not have grasped the concept and/or did not understand how to use the cards.

12. Addressing all the food chains:

Q. What role do all the producers here play in their forest ecosystem?

A. Producers use energy from the sun to produce their own food which makes the plants/producers grow.

Q. What role do all the consumers here play in their forest ecosystem?

A. Consumers eat producers and other consumers in order to get energy.

Q. What would a possible effect be on a food chain if an entire link were missing?

A. A consumer or several consumers would not have that producer or consumer to eat.

13. To see how that might look, ask the students with Grasses cards to release their piece of yarn.

Q. What just happened and what might happen?

A. A producer is gone, and the consumer that was linked to that producer will have to find something else to eat, and the consumers after that first consumer might have to find something else to eat.

Q. Raise your hand if you just "lost a meal." Would you starve?

A. Not unless all producers they eat in their ecosystem were gone, and they couldn't find the food they needed. If possible, they might go somewhere else for food.

Q. What might happen to a consumer that eats only one type of food and that food disappears?

A. Answers will vary. That consumer could starve or attempt to eat something else or move away, if possible, to where it could find more of its food.

14. Have the grasses rejoin their food chain by grasping the strand of yarn.

Q. Looking at all these food chains, is there one consumer we don't really need?

A. Answers will vary. Essentially, all consumers, even those that students may not like (snakes, voles, etc.) are all important parts of food chains and play a part in keeping a balance among populations. (Ex: Remove woodland voles = less food [energy] for snakes.)

Acorn

Producer

Eaten by: White-tailed deer, wild turkeys, fox squirrels, raccoons

Fruits & Berries

Producer

Eaten by: White-tailed deer, woodland voles, box turtles, coyotes, rabbits, songbirds

Hickory nuts

Producer

Eaten by: White-tailed deer, insects, woodland voles, wild turkeys, fox squirrels

Leaves

Producer

Eaten by: White-tailed deer, insects, woodland voles, box turtles, rabbits, caterpillars, walking sticks

Mayapple
Producer

Eaten by: Box turtles, white-tailed deer,
wild turkeys

Moss
Producer

Eaten by: White-tailed deer

Poison ivy
Producer

Eaten by: White-tailed deer, songbirds

Seeds
Producer

Eaten by: Woodland voles,
songbirds, fox squirrels

Virginia creeper vine

Producer

Eaten by: Songbirds, fox squirrels,
white-tailed deer, wild turkeys

Wildflowers

Producer

Eaten by: Insects, rabbits, white-tailed
deer, songbirds

Caterpillar

Consumer/Herbivore

Eats: Leaves

Eaten by: Songbirds, spiders, rough
green snakes

Cicada nymph

Consumer/Herbivore

Eats: Plant roots (fluids)

Eaten by: Box turtles, wild turkeys

<h1>White-tailed deer</h1> <p>Consumer/Herbivore</p> <p>Eats: Fruits & berries, mosses, wildflowers, leaves, acorns</p> <p>Eaten by: Coyotes eat young deer</p>	<h1>Fox squirrel</h1> <p>Consumer/Herbivore</p> <p>Eats: Acorns, hickory nuts</p> <p>Eaten by: Coyotes, foxes, raccoons, great horned owls, black rat snakes</p>
<h1>Insects</h1> <p>Consumer/Herbivore</p> <p>Eats: Leaves, wildflowers, fruits & berries</p> <p>Eaten by: Walking sticks, wild turkeys, coyotes, woodpeckers, striped skunks, treefrogs, rough green snakes, baldface hornets, tiger salamanders, raccoons, foxes, great horned owls, box turtles, spiders</p>	<h1>Rabbit</h1> <p>Consumer/Herbivore</p> <p>Eats: Wildflowers, leaves, fruits & berries, seeds</p> <p>Eaten by: Black rat snakes, coyotes, bobcats, great horned owls</p>

Walking stick

Consumer/Herbivore

Eats: Leaves

Eaten by: Wild turkeys,
songbirds, insects

Woodland vole

Consumer/Herbivore

Eats: Leaves, seeds, fruits & berries

Eaten by: Black rat snakes, coyotes,
great horned owls

Baldface hornet

Consumer/Carnivore

Eats: Insects

Eaten by: Woodpeckers, songbirds

Black rat snake

Consumer/Carnivore

Eats: Rabbits, woodland voles,
songbirds, grasshoppers, young deer

Eaten by: Bobcats, great horned owls

Bobcat

Consumer/Carnivore

Eats: Rabbits, songbirds, young deer, woodland voles, rough green snakes, young black rat snakes

Eaten by: Coyotes; great horned owls and foxes eat young bobcats

Great horned owl

Consumer/Carnivore

Eats: Rabbits, fox squirrels, striped skunks, woodland voles, insects

Eaten by: Raccoons and black rat snakes eat eggs

Rough green snake

Consumer/Carnivore

Eats: Insects, caterpillars, spiders

Eaten by: Black rat snakes, bobcats

Spider

Consumer/Carnivore

Eats: Insects, caterpillars

Eaten by: Tree frogs, songbirds, tiger salamanders, rough green snakes

Treefrog

Consumer/Carnivore

Eats: Insects, spiders

Eaten by: Black rat snakes

Striped skunk

Consumer/Omnivore

Eats: Fruits & berries, insects, woodland voles

Eaten by: Bobcats, great horned owls

Box turtle

Consumer/Omnivore

Eats: Leaves, fruits & berries, insects

Eaten by: Striped skunks, raccoons

Coyote

Consumer/Omnivore

Eats: Rabbits, woodland voles, fruits & berries, songbirds, young deer

Eaten by: Great horned owls eat young coyotes

Raccoon

Consumer/Omnivore

Eats: Fruits & berries, insects

Eaten by: Bobcats, coyotes

Fox

Consumer/Omnivore

Eats: Insects, songbirds, fruits & berries

Eaten by: Great horned owls

Wild turkey

Consumer/Omnivore

Eats: Acorns, insects, seeds, walking sticks, fruits & berries

Eaten by: Coyotes, bobcats

Songbirds

Consumer/Omnivore

Eats: Insects, fruits & berries, seeds, wildflowers

Eaten by: Bobcats, coyotes, striped skunks; Black rat snakes eat songbirds and songbird eggs

Woodpecker

Consumer/Omnivore

Eats: Insects, hickory nuts,
fruits & berries

Eaten by: Black rat snakes eat adult
woodpeckers and woodpecker eggs

Sun

activity 2

are there any “free” forest lunches?

estimated time

30–40 minutes

objectives

Students will be able to

1. Explain how an animal’s teeth can help identify the kind of consumer it is.
2. Categorize consumers by what they eat.
3. Explain how herbivores, carnivores and omnivores are different.
4. Define the roles of decomposers in an ecosystem.

teacher preparation

This is an outdoor activity and will require a large, open area. *Forest Food Chain Cards* will be used to demonstrate how herbivores, carnivores and omnivores differ, not only in what they eat and the specialized tooth structures that help them eat, but also in the variety and availability of food sources.

materials

Flip chart or small white board and markers

Forest Food Chain Cards (from Activity 1)

5–10 balls of yarn

procedure

1. Shuffle and distribute the *Forest Food Chain Cards* randomly to each student. **Make certain that a student has the Sun card.**
2. After students have read their cards carefully, indicate a place where all the herbivores should stand together, where all the carnivores should stand together, and where all the omnivores should stand together. Have students in the “vore” groups check each other’s cards to be sure everyone is sorted out correctly. There should be a group of producers left as well as the student with the Sun card.
3. Addressing the entire class:
Q. Based on the organism on your card, raise your hand if you are a consumer.
A. All but the producers and the sun should raise their hands.
Q. What specialized structures do you have to help you consume/eat other organisms?
A. Answers may vary, but students should note that each group of “vores” has different kinds of teeth.
4. Addressing the herbivores:
Q. What kind of teeth do you have and why?
A. Herbivores have snipping and grinding teeth because these teeth help them snip off and chew up plants.
5. Addressing the carnivores:
Q. What kind of teeth do you have and why?
A. Carnivores have sharp front teeth for gripping and tearing plus grinding teeth plus two sharp, pointed teeth on the sides of the front teeth for gripping and tearing. All of these teeth help carnivores grab, tear up and grind down the flesh and bones of animals.
6. Addressing the omnivores:

Q. What kind of teeth do you have and why?

A. Omnivores have teeth similar to both herbivores and carnivores because they eat plants and animals and need to grip, tear and grind both tough plants and the flesh and bones of animals.

Q. What about omnivores like songbirds, woodpeckers and wild turkeys? What kind of specialized structure do they have to help them capture insects and eat seeds and fruit?

A. Omnivores like songbirds, woodpeckers and wild turkeys have no teeth at all. Instead they have beaks that help them capture insects and eat seeds and fruits. Great horned owls are carnivores. They do not have teeth but use their sharp beaks for tearing apart their food.

7. Address the producers and the sun and ask this “trick” question:

Q. Those of you left here, what kind of teeth do you have?

A. Producers do not eat other organisms, and therefore, have no tooth structures. Producers get energy directly from the sun to make their own food. The sun is the source of all energy and is not an organism.

8. Bring the student with the Sun card to the center of the open area and remind him/her of the important role he/she is about to play. (See *Activity 1*) Place several balls of yarn near the Sun.

[If students would benefit from reinforcement of basic food chain concepts, guide students through the steps listed in these procedures for *Activity 2*.

However, if students have grasped the concepts of food chains and have demonstrated a high level of understanding and of competency during *Activity 1*, instruct students to work together to create one food chain at a time as described in these procedures. Students may use the balls of yarn “to stay linked” or eliminate the yarn and stand in clear, straight rows radiating from the sun. This might appear chaotic at first, but if the students do understand what they are doing, it could also help to change up the approach to creating food chains and increase interest and fun.]

9. Address the entire class:

Q. Which organisms should be connected directly to the Sun?

A. Producers.

10. Have producers raise their hands, and choose one producer at a time to step forward. While the Sun is holding the end of a ball of yarn and unwinding it and handing it to the producer, ask:

Q. What organism are you?

A. Acorn, mosses, mayapple, etc.

Q. What role do you play in an ecosystem?

A. Producer.

Q. Why do you think you should connect to this food chain here?

A. I get energy to make my own food directly from the sun.

11. Continue linking producers to the Sun until they are either all linked OR until the Sun has used all the available balls of yarn. Have any unlinked producers stand over to the side.

Q. What might happen to a producer that does not receive enough sun, water, nutrients, etc.?

A. It might die.

Q. What happens to producers that die?

A. They begin to break down or decompose and eventually become part of the soil.

12. Indicate a place off to the side of the group as the place for unlinked/decomposing organisms. Ask students to give the place a name. The name could be funny/clever/etc. but should relate to decomposition (Ex: Decomp Hill; Soil Will Be Us; Break Down Dump).

Throughout this entire activity, send any students incorrectly (based on the information on their cards) attempting to link to a food chain to the decomposition area.

13. Repeat the process with consumers. Ask the consumers who could be linked to one of the available producers linked to the Sun, to raise their hands. Choose students randomly and ask each one as he/she stands next to a producer:
- Q. What organism are you?**
A. Answers will vary but should include animals only.
- Q. What kind of consumer are you?**
A. Answers will vary but should include herbivores, omnivores only.
- Q. What role do you play in an ecosystem?**
A. Answers will vary. Depending on the specific organism, answers should include:
- Consumers eat producers and other consumers and help to pass energy up through a food chain.
 - Herbivores eat producers and help to pass energy up through the food chain.
 - Omnivores eat producers and other consumers and help to pass energy up through the food chain.
- Q. Why do you think you should connect to this food chain here?**
A. Answers will vary but should be based on information on their cards. (Ex: Because I am a consumer/herbivore/ omnivore that consumes [names the particular plant to which they will connect] for energy.)
14. Have students unwind the ball of yarn as it is passed to the consumer. Enough yarn should be unwound to allow about two feet of space between them. The sun and all producers and consumers should continue to hold onto the piece of yarn.
15. Addressing any organisms remaining in the herbivore group:
- Q. What has happened to these herbivores?**
A. There are no producers left for them to eat.
- Q. What could happen to them?**
A. These herbivores would either starve or move away (if possible) to find producers somewhere else.
- Q. Where should we place them now?**
A. In the decomposition area!
16. Continue the process with the remaining consumers. Ask students who think they could link with one of the food chains to raise their hands. Choose students randomly and repeat the questions for each student as they step up to their chosen chain and unwind and pass along the ball of yarn.
- Q. What organism are you?**
A. Answers will vary but should include animals only.
- Q. What kind of consumer are you?**
A. Answers will vary but should include carnivores and/or omnivores.
- Q. What role do you play in an ecosystem?**
A. Answers will vary. Depending on the specific organism, answers should include:
- Consumers eat producers and other consumers and help to pass energy up through a food chain.
 - Carnivores eat other consumers and help to pass energy up through the food chain.
 - Omnivores eat producers and other consumers and help to pass energy up through the food chain.
- Q. Why do you think you should connect to this food chain here?**
A. Answers will vary but should be based on information on their cards. (Ex: Because I am a consumer/carnivore / omnivore that consumes [names the particular animal to which they will connect] for energy.)
17. Repeat the process, asking for students to step up as part of the next link in one of the food chains. Students from this point on should be carnivores and omnivores only but must reference the information on their card to prove that they would eat the organism to which they plan to link.
- Continue until all students are linked to a food chain or unlinked students/consumers have no place to connect. Send unlinked students to the decomposition area.
18. Use a flip chart or small white board to capture this information for each food chain:
- Q. How many producers?**
Q. How many herbivores?
Q. How many carnivores?

Q. How many omnivores?

Q. How many decomposing organisms left at the decomposition area?

Q. Who or what is going to clean up all those decomposing organisms?

A. Decomposers (fungi and bacteria) and scavengers (insects, earthworms, sowbug, etc.).

19. Have students roll up the balls of yarn and place them in the center of the open area. Collect and redistribute the cards randomly. **Instruct students to create new food chains on their own for their forest ecosystem.** This should create something close to chaos as students read their cards, find the Sun, question each other and attempt to link with a food chain. Students who think they cannot connect into any of the chains should move to the decomposition area.
20. Review and discuss each component of each food chain. Send any students linked incorrectly to the decomposition area, and randomly select a student already in the decomposition area to see if he/she can connect somewhere in one of the chains without jeopardizing a student already in place.
21. Record the number of successful organisms (those linked somewhere in the food chains) and include those numbers as a second set on the flip chart/white board.
22. Have students work in groups to create graphic organizers for each set of food chains illustrating the following information:
 1. **Which type of organism listed had the lowest number?**
 2. **Which type of organism had the highest number?**
 3. **What general conclusion might you draw from this? What did you notice about these numbers?**

A. Answers will vary. There are more producers. There are many decomposing organisms. There are more omnivores than herbivores or carnivores, etc.

Q. How would you explain this?

A. Answers will vary. As long as there is sunlight, soil, water and nutrients, producers will grow and will have the most stored energy in a food chain. Omnivores eat a larger variety of food. However, there really are no free lunches, and even omnivores sometimes have difficulty finding food. One thing that might be noted is the fact that there were always students "decomposing" and returning nutrients back into the soil.

activity 3

forest food web

grades

3rd–5th

objectives

Students will be able

1. Categorize consumers by what they eat.
2. Define organism, population, community and ecosystem.
3. Sequence the flow of energy through a forest food chain.
4. Define a food web.
5. Predict the possible effects of removing a population from a food web.
6. Predict the possible effects on populations in a forest ecosystem if the ecosystem were destroyed by flooding, fire, human development, etc.

teacher preparation

This activity will work best outdoors in a large open area. This activity provides reinforcement of concepts addressed in *Activities 1* and *2* but would also stand alone if students already have the necessary prior knowledge to create food chains.

materials

Large ball of yarn

Forest Food Chain Cards

procedure

1. In the large, open area, arrange students in a circle.
As a quick review:
Q. What do we call a single living thing that is able to grow and reproduce?
A. An organism.
Q. What do we call it when more than one of the same organism lives in the same area?
A. A population.
Q. What do we call a group of populations living together in the same area?
A. A community.
Q. Put several communities together and have them interact with all the living and non-living things in the same area, and what do we have?
A. An ecosystem.
2. Explain that they are about to become organisms that are part of a community. Distribute the *Forest Food Chain Cards* randomly and instruct students to read the information on their card carefully. **Make certain that a student has the Sun card.**
3. Address the circle of students:
Q. What is the first link in any food chain?
A. The sun is the first link in any food chain.
Q. Where is our sunshine?

Have the student with the sun card step into the center of the circle. Make a big deal over the sun, have the group applaud the sun, and remind everyone that we all need the sun in order to survive!

4. Stand in the center of the circle with the sun and hand the loose end of the ball of yarn to the sun. Begin to unwind the yarn while addressing the circle:

Let's build a food chain.

Q. What organisms get their energy directly from the sun?

A. Producers get their energy directly from the sun in order to grow.

5. Where are our producers? Have students with producer cards raise their hands. Choose one and have that student state what producer he/she is. Unwind the ball of yarn and pass the ball of yarn to that student.

6. Addressing the circle:

Q. What would eat a producer?

A. A consumer (that could be either an herbivore or an omnivore).

7. Raise your hand if you are a consumer that would eat this producer (the student holding the ball of yarn). Check with the class to be certain that the link makes sense according to the cards, unwind the ball of yarn and pass it to the consumer.

Q. What would eat a consumer?

A. Another consumer (that could be either a carnivore or an omnivore).

8. Raise your hand if you are a consumer that would eat this consumer (the student holding the ball of yarn). Check with the class to be certain that the link makes sense according to the cards, unwind the ball of yarn and pass it to the consumer.

9. Continue with this first food chain until there are no logical consumers to add to the chain. Some chains could be long, and some could be very short.

10. Unwind and return the ball of yarn to the sun. Remind everyone to hold onto their piece of yarn. Dropping it would spoil the entire activity—and disappoint many “hungry organisms.”

11. Repeat the process beginning with the sun (now the sun has the loose end and a piece of yarn to hold), ask for a producer, check the link, unwind the yarn and have the producer hold on to the yarn, ask for a consumer, unwind the yarn and have that consumer hold onto the yarn, etc.

12. Continue adding food chains until everyone is connected. Return to the sun to begin each new chain. **Students may become part of more than one food chain, and those students must be extra careful not to drop the yarn section that they are holding.**

13. When everyone has been linked into one or more food chains:

Q. Which organism do you think is least important?

A. Answers will vary. Students often choose insects, snakes, spiders, etc.

“Insects really are a bother to us. Let's get rid of this insect (choose one student holding an insect card). Wouldn't that be great?” Build up their enthusiasm.

14. Remind students to hold on to their yarn and have the student holding the insect card to gently tug on his/her string.

- Instruct any students who feel that tug to tug gently.
- Repeat the instruction until everyone feels the tug and is tugging.
- Have the students stop tugging but continue holding onto their yarn.

Q. Did everyone feel a tug?

Q. Black rat snakes do not eat insects, so why would the black rat snake feel the tug?

A. Answers will vary, but elicit from the students that all of these organisms were connected in some way and that removing one population of organisms affects everything in the community.

“We had better keep those insects around and not get rid of them all.”

15. Have students choose another producer or consumer they think they could live without. Repeat the tugging exercise by having one student with that card gently tug on his/her yarn. Anyone who feels that tug should tug gently, etc. Continue until all the students are tugging.
- Q. How could [name that organism] affect so many other organisms?**
- A. Every organism in each population in the community would be affected in some way. Producers and consumers are linked together in food chains.
16. Repeat as often as necessary to reinforce the concept or as long as students are engaged and enjoying the activity.
17. Instruct the students to place the yarn carefully on the ground so that the shape of the yarn is still clear. Have the sun (student) remain in the middle holding the yarn.
- Q. The individual food chains in here are hard to see. Instead of chains, what does this look like now?**
- A. A web. It's a food web which is a number of food chains all combined together. Make a big deal over the fact that the sun is important to every organism in the food web.
- Rewind the yarn onto the ball while engaging students in a discussion:
- Q. If there are populations of organisms living together in this web, what would be another name for this web?**
- A. A community.
- Q. In what sort of ecosystem would a community with these populations probably be found?**
- A. A forest ecosystem. The populations of organisms in this community are commonly found in areas covered with trees because they find what they need to survive in such an ecosystem. A forest ecosystem provides them with the food, water, shelter, space, light and nutrients necessary to the survival of forest organisms.
18. Have students work in groups to predict what might happen to one or more of the populations of organisms from the *Forest Food Chain Cards* if a large section of their ecosystem were destroyed by flooding, fire, human development, etc.

Adapted from activities presented at the Missouri Department of Conservation Springfield Conservation Nature Center.

Organism	Eats (Gets energy)	Eaten by	Producer	Consumer	Herbivore	Carnivore	Omnivore
PRODUCERS							
Acorns	Energy from Sun	Deer, wild turkeys, fox squirrels, raccoons	X				
Fruits & berries	Energy from Sun	Deer, woodland voles, box turtles, coyotes, rabbits, raccoons, songbirds, insects, striped skunks, foxes, wild turkeys, woodpeckers	X				
Hickory nuts	Energy from Sun	Deer, insects, woodland voles, wild turkeys, fox squirrels, woodpeckers	X				
Leaves	Energy from Sun	Deer, insects, woodland voles, box turtles, rabbits, caterpillars, walking sticks	X				
Mayapple	Energy from Sun	Box turtles, deer, wild turkeys, cicada nymphs					
Mosses	Energy from Sun	Deer	X				
Poison ivy	Energy from Sun	Deer, songbirds	X				
Seeds	Energy from Sun	Woodland voles, rabbits, songbirds, fox squirrels, wild turkeys	X				
Virginia creeper vine	Energy from Sun	Songbirds, cicada nymphs, deer, wild turkeys	X				
Wildflowers	Energy from Sun	Insects, rabbits, deer, songbirds, cicada nymphs	X				
HERBIVORES							
Caterpillar	Leaves	Songbirds, spiders, rough green snakes		X	X		
Cicada nymph	Plant roots (fluids) of—Virginia creeper vines, wildflowers, mayapples	Box turtles, wild turkeys		X	X		
Deer	Fruits & berries, hickory nuts, mosses, leaves, wildflowers, acorns, mayapples, poison ivy, Virginia creeper vines	Coyotes, bobcats		X	X		

Organism	Eats (Gets energy)	Eaten by	Producer	Consumer	Herbivore	Carnivore	Omnivore
Fox squirrel	Acorns, hickory nuts, seeds	Coyotes, foxes, black rat snakes, great horned owls		X	X		
Insects	Leaves, wildflowers, fruits & berries, hickory nuts	Wild turkeys, coyotes, woodpeckers, striped skunks, treefrogs, rough green snakes, baldface hornets, raccoons, foxes, great horned owls, box turtles, spiders, songbirds		X	X		
Rabbit	Wildflowers, leaves, fruits & berries, seeds	Black rat snakes, coyotes, bobcats, great horned owls		X	X		
Walking stick	Leaves	Wild turkeys, songbirds		X	X		
Woodland vole	Leaves, hickory nuts, seeds, fruits & berries	Black rat snakes, coyotes, bobcats, great horned owls, striped skunks		X	X		
CARNIVORES							
Bald face hornet	Insects	Woodpeckers, songbirds		X		X	
Black rat snake	Rabbits, woodland voles, songbirds, rough green snakes, woodpeckers, fox squirrels, tree frogs, great horned owls	Bobcats, great horned owls		X		X	
Bobcat	Rabbits, songbirds, young deer, woodland voles, rough green snakes, young black rat snakes, striped skunks, box turtles, wild turkeys, raccoons	Great horned owls (eat young bobcats)		X		X	
Great horned owl	Rabbits, fox squirrels, striped skunks, woodland voles, insects, foxes, young coyotes, young bobcats, young black rat snakes	Black rat snakes (eat young owls and owl eggs)		X		X	

Organism	Eats (Gets energy)	Eaten by	Producer	Consumer	Herbivore	Carnivore	Omnivore
Rough green snake	Insects, caterpillars, spiders	Black rat snakes, bobcats		X		X	
Spider	Insects, caterpillars	Tree frogs, songbirds, rough green snakes		X		X	
Treefrog	Insects, spiders	Black rat snakes		X		X	
OMNIVORES							
Striped skunk	Fruits & berries, insects, woodland voles, songbirds	Bobcats, great horned owls					X
Box turtle	Leaves, fruits & berries, insects, mayapples, cicada nymphs	Raccoons, bobcats		X			X
Coyote	Rabbits, woodland voles, fruits & berries, songbirds, young deer, fox squirrels, insects, raccoons, wild turkeys	Great horned owls (eat young coyotes)		X			X
Raccoon	Fruits & berries, insects, acorns, box turtles	Bobcats, coyotes		X			X
Fox	Insects, songbirds, fruits & berries, hickory nuts, fox squirrels	Great horned owls		X			X
Wild turkey	Acorns, insects, seeds, fruits & berries, mayapples, cicada nymphs, walking sticks	Coyotes, bobcats		X			X
Songbirds	Insects, fruits & berries, seeds, wildflowers, poison ivy, Virginia creeper vines, caterpillars, walking sticks, baldface hornets, spiders	Black rat snakes, bobcats, coyotes, striped skunks		X			X
Woodpecker	Insects, hickory nuts, fruits & berries, baldface hornets	Black rat snakes (eat young woodpeckers & woodpecker eggs)		X			X

so, what do you know?

questions

1. Where do plants get the energy they need to produce their food?













- a. Animal b. Plant c. Sun d. Water

2. Plants produce their own food. So they are called:

- a. Consumers b. Decomposers c. Populations d. Producers

3. What is the difference between producers and consumers?

4. Identify which organisms are consumers by placing the letter "C" in the line next to the picture. For producers, place the letter "P" on the line. (C=consumer, P=producer)

 _____ Wildflowers	 _____ Squirrel	 _____ Woodpecker	 _____ Tree	 _____ Deer	 _____ Box turtle
 _____ Wild turkey	 _____ Mayapple	 _____ Rabbit	 _____ Acorn	 _____ Black rat snake	 _____ Owl

5. Make a food chain using the pictures below. Put a number 1 by the first thing, number 2 by the second thing and number 3 by the third thing in this food chain.

 Mayapple	 Sun	 Deer
---	--	---

6. Use words or pictures and words to make a forest ecosystem food chain with four links. Do not use mayapples or deer.

7. A prairie food chain is pictured below. What could happen if all of the leaf beetles died from disease?



8. What do herbivores eat?

9. What do carnivores eat?

10. What do omnivores eat?

11. Using the information you have learned in this unit, circle all of the categories you fit in.

Producer Consumer Herbivore Carnivore Omnivore

12. What role do decomposers play in an ecosystem?

13. For each living thing, place an X in the column or columns that apply. Some living things fit under more than one category.

	Producer	Consumer	Herbivore	Carnivore	Omnivore
Fox squirrel					
Fruits & berries					
Bobcat					
Treefrog					
Acorns					
Baldface hornet					
Mosses					
Insects					
Songbirds					
Mayapple					
Hickory nuts					
Seeds					
Deer					
Box turtle					
Cicada nymph					
Rabbit					
Wild turkey					

so, what do you know?

answers

1. Where do plants get the energy they need to produce their food? (1 point)

Answer— c. Sun













2. Plants produce their own food. So they are called: (1 point)

Answer— d. Producers

3. What is the difference between producers and consumers? (2 points for answers that convey the same meaning as the answer provided below)

Answer— Producers use the energy from the sun to produce their own food.—*AND*—Consumers eat plants or other animals to get the food and energy they need. They can't produce their own energy.

4. Identify which organisms are consumers by placing the letter "C" in the line next to the picture. For producers, place the letter "P" on the line. (C=consumer, P=producer)

<u>P</u>  Wildflowers	<u>C</u>  Squirrel	<u>C</u>  Woodpecker	<u>P</u>  Tree	<u>C</u>  Deer	<u>C</u>  Box turtle
<u>C</u>  Wild turkey	<u>P</u>  Mayapple	<u>C</u>  Rabbit	<u>P</u>  Acorn	<u>C</u>  Black rat snake	<u>C</u>  Owl

5. Make a food chain using the pictures below. Put a number 1 by the first thing, number 2 by the second thing and number 3 by the third thing in this food chain. (1 point)

 2 Mayapple	 1 Sun	 3 Deer
---	--	---

6. Use words or pictures and words to make a forest ecosystem food chain with four links. Do not use mayapples or deer. (4 points)

Answer— Any food chain found in a forest ecosystem is acceptable as long as it has: sun, plant, herbivore or omnivore and omnivore or carnivore.

7. A prairie food chain is pictured below. What could happen if all of the leaf beetles died from disease? (4 points for any one of the following answers)



Possible answers— The crayfish would have less food to eat; Some crayfish might die because they didn't have enough food to eat; There may not be any animals to eat the decaying plants; The frogs might not have enough crayfish to eat; or other plausible answer.

8. What do herbivores eat? (1 point)

Answer—Plants

9. What do carnivores eat? (1 point)

Answer—Animals

10. What do omnivores eat? (1 point)

Answer—Plants and animals

11. Using the information you have learned in this unit, circle all of the categories you fit in. (2 points)

Producer Consumer Herbivore Carnivore Omnivore

Answer—should include Consumer *AND* herbivore or omnivore

12. What role do decomposers play in an ecosystem? (2 points)

Answer—Decomposers eat and break down scat, or animal droppings, and dead plants and animals into tiny pieces.

OR Other answers that convey the same meaning.

13. For each living thing, place an X in the column or columns that apply. Some living things fit under more than one category. (1 point for each X in the correct row and column; max. 40 points)

	Producer	Consumer	Herbivore	Carnivore	Omnivore
Fox squirrel		X			X
Fruits & berries	X				
Bobcat		X		X	
Treefrog		X		X	
Acorns	X				
Baldface hornet		X		X	
Mosses	X				
Insects		X	X		
Songbirds		X			X
Mayapple	X				
Hickory nuts	X				
Seeds	X				
Deer		X	X		
Box turtle		X			X
Cicada nymph		X	X		
Rabbit		X	X		
Wild turkey		X			X

wrap-up/formative assessment strategies

There are many different strategies available to teachers to determine whether students have grasped and understand concepts addressed by the objectives indicated for each lesson and activity. A few suggested strategies are listed below and referenced throughout the unit where specific, formative assessment strategies have not been included.

Regardless of the strategies used to gather information about what students know and what they can do, it is important to use the information gathered to inform and enhance teacher instruction. Students may remain anonymous for some strategies.

exit note

Ask students to write an exit note that includes a question they still have about what they learned in the activity and/or a question they would like to investigate. Exit notes can be written on a piece of paper and placed in an “Exit Note” box placed near the classroom door, written on a Post-it note and stuck to a designated spot on the wall near the door, written on a piece of paper and stuck to a self-stick bulletin board, etc. Determine whether student submissions should remain anonymous. Exit notes should be reviewed to determine what concepts need to be re-taught before moving on to the next activity.

group report with presentation

Divide the class into groups of four students. Number each group’s team members 1–4. Within each group, give each group one or more questions to answer related to the activity. Activity objectives and the questions students are being asked will determine the length of time required for this strategy. Explain that all group members should be prepared to give a brief presentation of the answers to their question(s). Roll a dice for each group to determine who will give the presentation for the group.

popcorn balls or snowballs

Prepare question(s) in advance or pose one based on any problem areas arising during the activity. Ask students to answer one multiple choice question and have each student write an explanation of his/her answer choice on a piece of paper. Instruct students to crumble up their paper like a snowball or ball of popcorn. When ready, have students toss their snowballs/popcorn balls to other students. Repeat tosses at least three times to ensure balls of paper are thoroughly mixed up. Ask a student to read the answer and explanation on his/her paper. Call upon other students to do the same before asking students if they agree or not with the answer selected and explanation given. Discuss as needed.

think-pair-share

Assign a question or problem for the class. Allow time for individuals to think silently about it and then have students pair up and exchange thoughts. Have the pairs share their responses with the class.

open-ended inquiry questions

Ask a student an open-ended inquiry question. Ask the rest of the class whether they agree or disagree with the student’s answer and why? Ask additional questions and discuss as needed.